



Supplement of

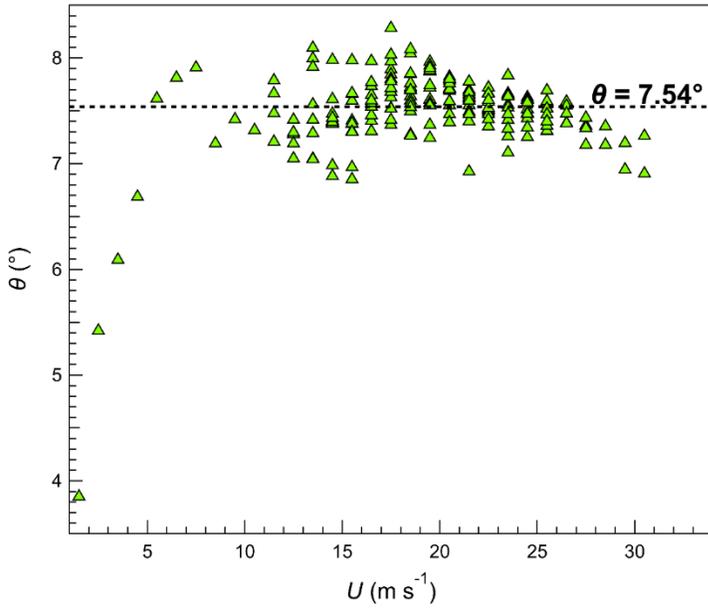
The measurement of mean wind, variances, and covariances from an instrumented mobile car in a rural environment

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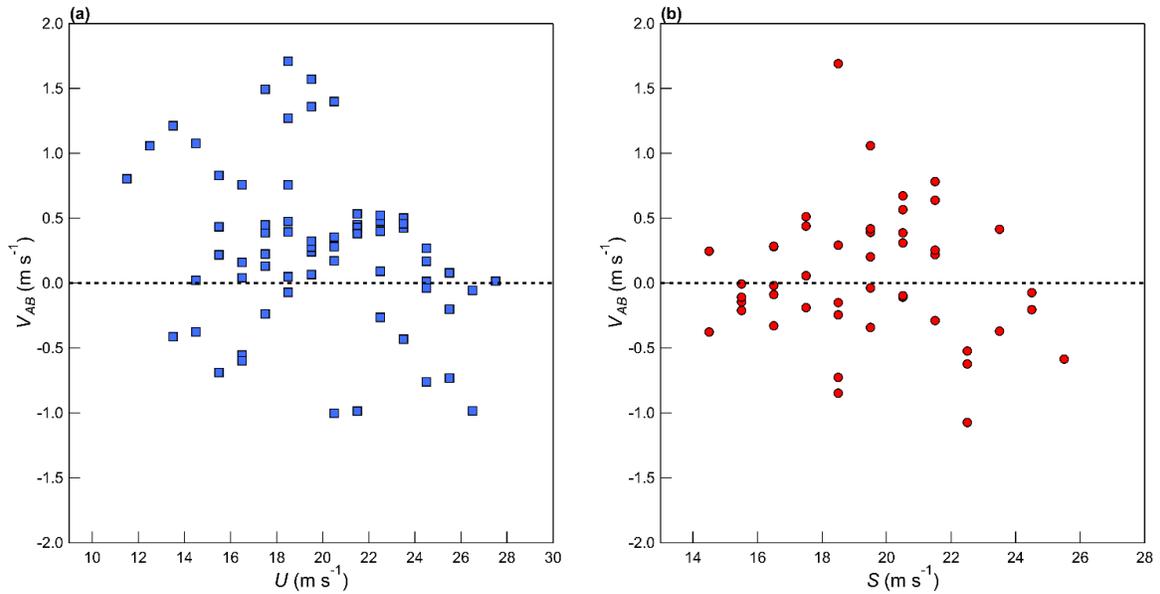
1 **Supplementary material**



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3 **Figure S1:** The flow distortion correction angle calculated for each binned value shown in Fig. 3. The dashed black line
4 shows the median value of the set.

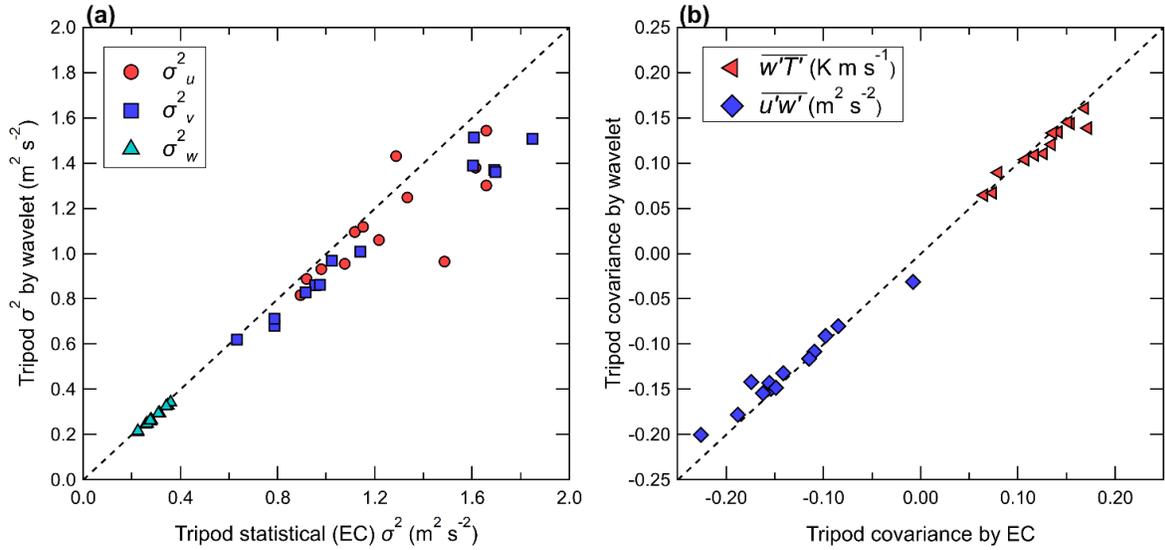
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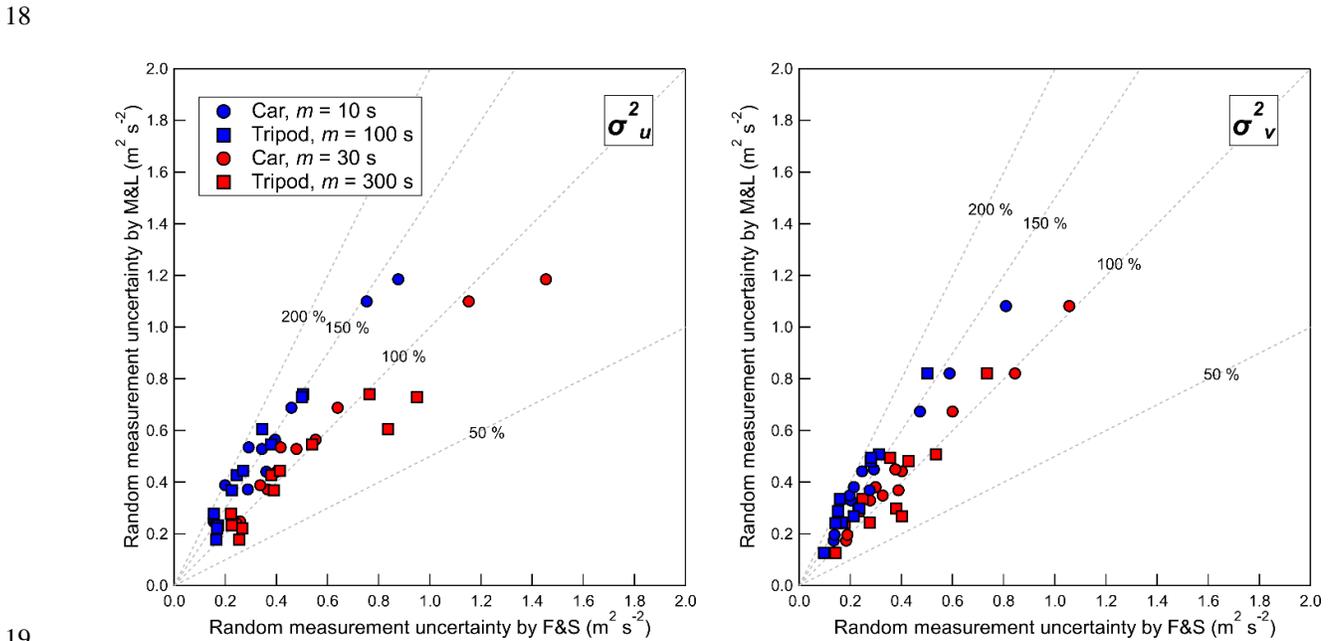
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7 **Figure S2:** (a) The measured lateral velocity V_{AB} plotted as a function of the measured U ; (b) the measured lateral velocity
8 V_{AB} plotted function of the vehicle speed (S). Measurements are binned using a bin size of 1 m s^{-1} . Data shown are for both
9 20 and 22 Aug.

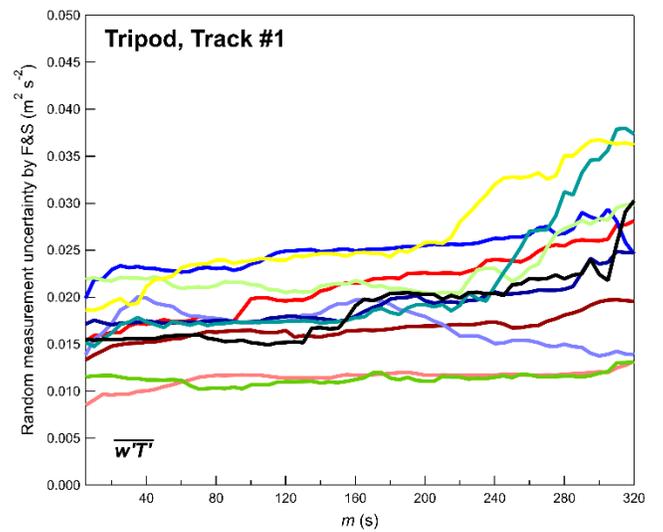
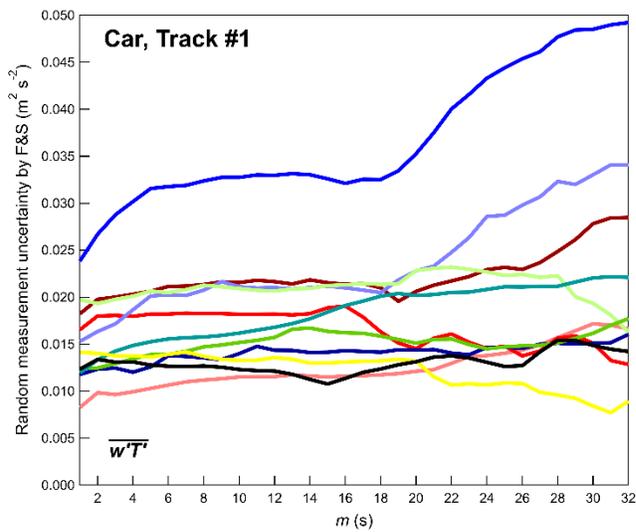
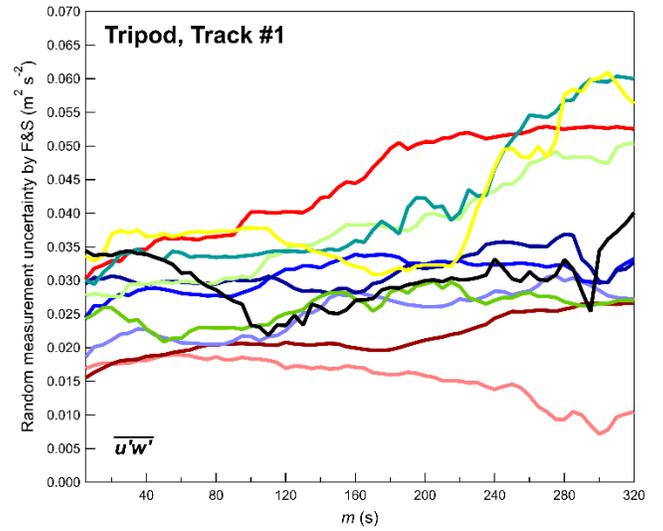
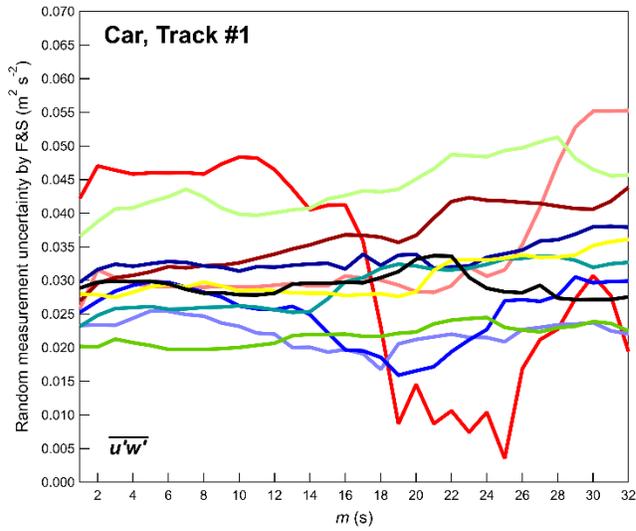
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 12 **Figure S3: A comparison of the (a) velocity variances and (b) covariances measured on the tripod, using two calculation**
 13 **methods: the variances and covariances are calculated with eddy-covariance (x-axis) or wavelet analysis (y-axis). All passes**
 14 **from 20 and 22 Aug are included, and calculations are done as in Fig. 7. However, wavelet analysis is completed using the**
 15 **Mexican hat analyzing wavelet instead of the Morlet analyzing wavelet. The Morlet analyzing wavelet is not used since**
 16 **some passes would include edge effects in the calculation of variances and covariances, since the tripod record was ended**
 17 **soon after the final vehicle pass on both 20 and 22 Aug.**



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 20 **Figure S4: A comparison of uncertainty estimate by F&S and M&L of the horizontal velocity variances for two choices of**
 21 **parameter m : (1) car uses $m = 10$ s and the tripod uses $m = 100$ s and (2) the car uses $m = 30$ s and the tripod uses $m = 300$**
 22 **s.**



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26 **Figure S5: The uncertainty calculated using F&S (i.e., Eq. (17)) as a function of parameter m . Tripod measurements are**
 27 **shown in the right panel and mobile car measurements are shown in the left panel.**

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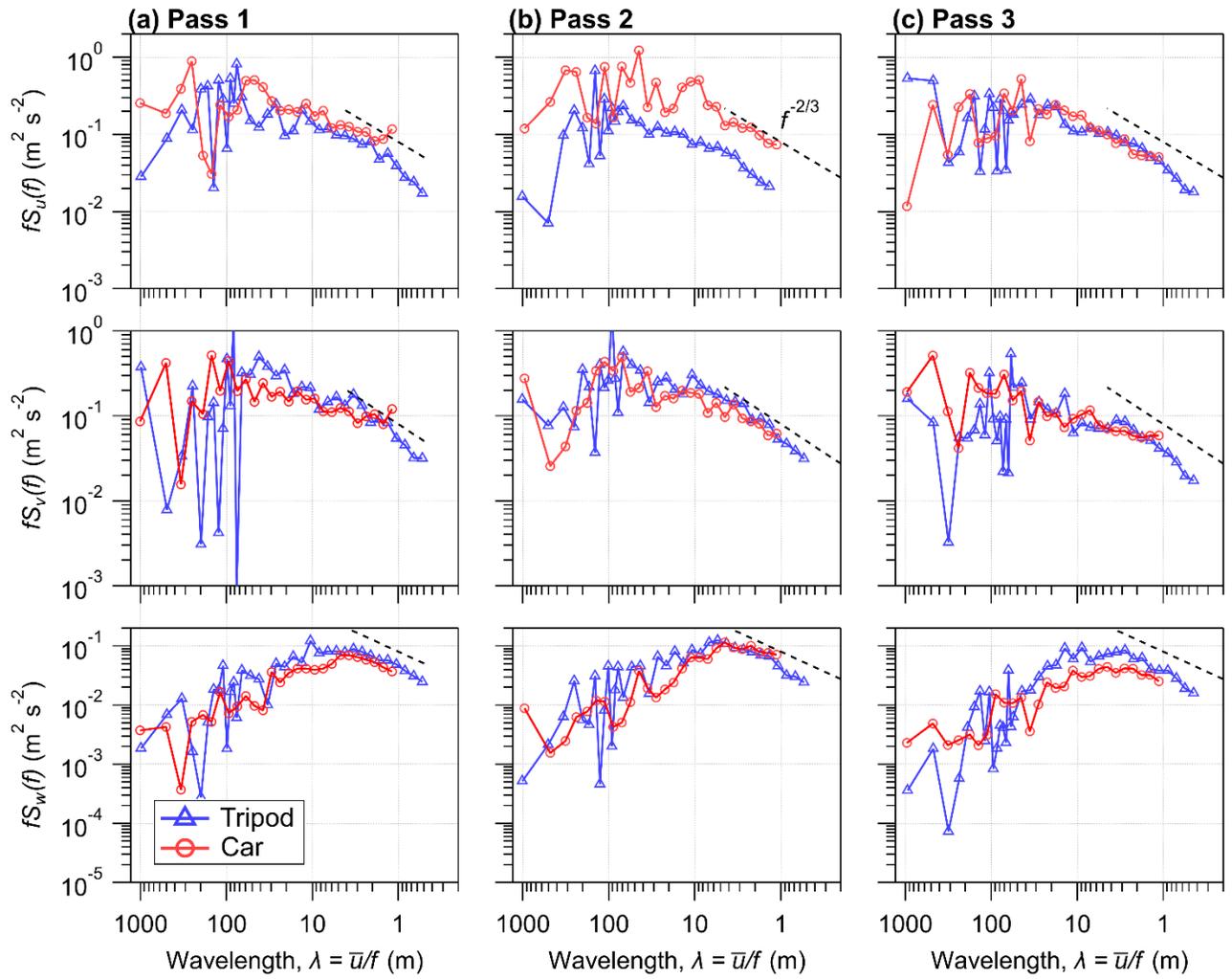
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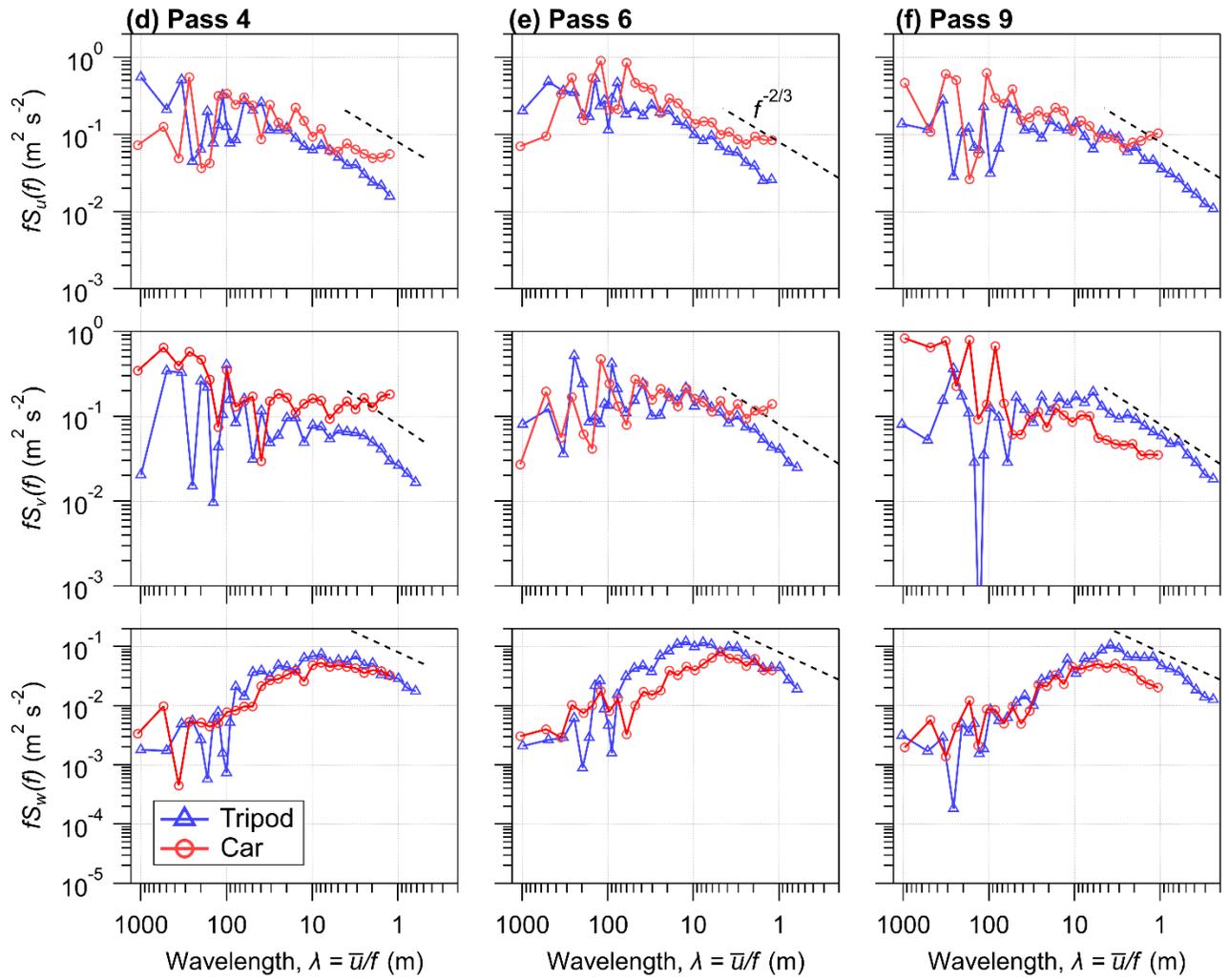
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37 **Figure S6: Spectra of u (top), v (middle) and w (bottom) measured on some additional measurement passes of Track #1.**

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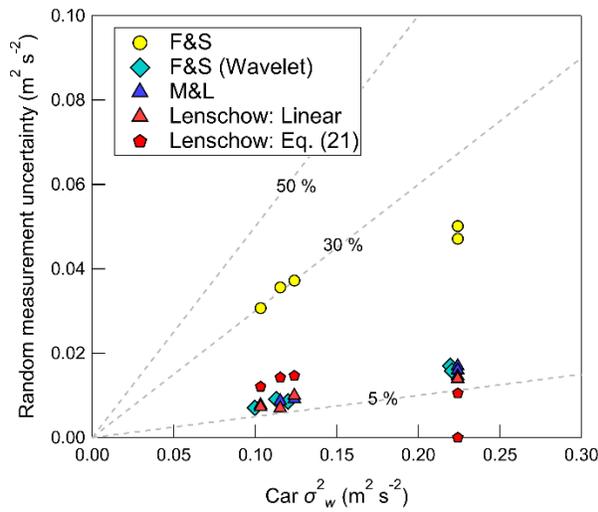
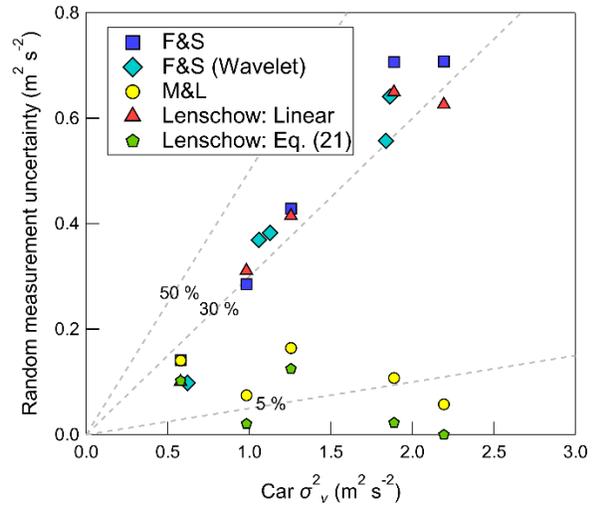
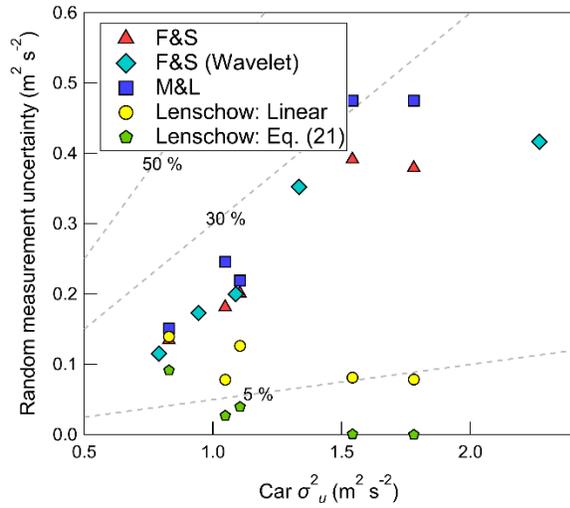
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50 **Figure S7: Random measurement uncertainty as a function of the measured velocity variances while driving on a gravel**
 51 **road.**

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53 **Table S1: Statistics calculated over all passes in Track #1 only.**

	MBE_{EC}	MBE_W	$RMSE_{EC}$	$RMSE_W$	Mean _{EC} Car	Mean _W Car	Mean _{EC} Tripod
$\overline{u'^2}$ ($m^2 s^{-2}$)	0.48	0.37	0.85	0.70	1.74	1.63	1.26
$\overline{v'^2}$ ($m^2 s^{-2}$)	0.23	0.07	0.55	0.38	1.36	1.19	1.18
$\overline{w'^2}$ ($m^2 s^{-2}$)	-0.10	-0.10	0.10	0.11	0.18	0.17	0.29
$\overline{u'w'}$ ($m^2 s^{-2}$)	0.01	0.03	0.07	0.07	-0.13	-0.11	-0.14
$\overline{w'T'}$ ($K m s^{-1}$)	-0.05	-0.05	0.06	0.06	0.07	0.08	0.13
\bar{u} ($m s^{-1}$)	0.15	--	0.43	--	2.54	--	2.42

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56 **Table S2: Statistics calculated over all passes in Track #2 only.**

	MBE _{EC}	MBE _W	RMSE _{EC}	RMSE _W	Mean _{EC} Car	Mean _W Car	Mean _{EC} Tripod
$\overline{u'^2}$ (m ² s ⁻²)	1.26	0.51	1.79	0.79	2.50	1.74	1.26
$\overline{v'^2}$ (m ² s ⁻²)	0.23	0.07	0.63	0.44	1.40	1.23	1.20
$\overline{w'^2}$ (m ² s ⁻²)	-0.11	-0.11	0.13	0.13	0.17	0.16	0.29
$\overline{u'w'}$ (m ² s ⁻²)	-0.001	0.02	0.09	0.09	-0.13	-0.11	-0.14
$\overline{w'T'}$ (K m s ⁻¹)	-0.04	-0.03	0.05	0.05	0.08	0.09	0.13
\bar{u} (m s ⁻¹)	-0.01	--	0.71	--	2.36	--	2.40

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58 **Table S3: Turbulence statistics measured on the instrumented car during the 1000 m track.**

Track 1	1	2	3	4	5	6	7	8	9	10	11
Statistics on instrumented car: 1000 m track											
I_u (s)	1.11	0.69	0.64	0.68	0.99	0.55	2.25	2.06	1.88	1.34	1.01
I_v (s)	0.82	1.32	1.72	1.60	0.60	0.43	1.29	1.03	3.33	1.72	1.20
I_w (s)	0.11	0.07	0.09	0.08	0.06	0.12	0.04	0.12	0.06	0.05	0.14
I_{uw} (s)	0.07	0.05	0.08	0.14	0.08	0.03	0.04	0.02	0.06	0.04	0.04
I_{wt} (s)	0.10	0.04	0.11	0.06	0.13	0.04	0.04	0.08	0.05	0.03	0.03
$ R_{uw} $	0.24	0.24	0.35	0.30	0.30	0.20	0.18	0.19	0.17	0.16	0.27
$ R_{wT} $	0.34	0.23	0.32	0.25	0.31	0.24	0.21	0.17	0.30	0.15	0.24
T (s)	48	48	48	49	57	49	42	41	51	41	40
\bar{S} (m s ⁻¹)	20.5	20.7	20.9	20.4	17.5	20.4	23.8	24.1	19.5	24.4	25.2

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60 **Table S4: Turbulence statistics measured on the tripod corresponding to the 1000 m track.**

Track 1	1	2	3	4	5	6	7	8	9	10	11
Statistics on tripod, period corresponding to 1000 m track											
I_u (s)	4.58	3.94	25.2	21.7	12.0	9.78	6.19	11.1	11.6	14.1	12.6
I_v (s)	10.6	3.62	16.0	10.5	16.1	5.14	14.8	3.60	8.38	23.7	8.93
I_w (s)	0.66	0.59	0.44	0.44	0.47	0.44	0.30	0.39	0.25	0.28	0.31
I_{uw} (s)	0.40	0.42	0.42	0.41	0.42	0.33	0.20	0.37	0.19	0.15	0.21
I_{wt} (s)	0.30	0.26	0.44	0.41	0.33	0.25	0.24	0.25	0.22	0.27	0.21
$ R_{uw} $	0.26	0.29	0.24	0.30	0.01	0.25	0.18	0.37	0.23	0.26	0.17
$ R_{wT} $	0.42	0.36	0.36	0.40	0.20	0.42	0.33	0.48	0.32	0.29	0.33
T (s)	420	420	420	360	300	360	480	360	420	480	420

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